Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 160101 Date: 02/01/2013

Subject Name: Aerodynamics - II

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Draw wing planform geometry and define following terms: (i) Mean chords (ii) Aspects ratio (iii) Sweepback angle (iv) Dihedral angle	07
	(b)	Explain streamline, stream function, angular velocity, vorticity.	07
Q.2	(a)	Prove that Show that for thin symmetric airfoils the centre of pressure is the quarter chord position	07
	(b)	For a cambered airfoil at an angle of attack of 5^0 the lift coefficient is 0.95and pitching moment coefficient about quarter chord= -0.1. Find the location of the centre of pressure. What is the pitching moment coefficient about the leading edge of the airfoil?	07
		OR	
	(b)	The normal force is acting at the midpoint of the chord. Find the moment on the airfoil at the leading edge of the airfoil.	07
Q.3	(a)	Explain the following: (i) lifting-surface concept (ii) Panel solutions.	07
	(b)	Explain about the vortex lattice system on a finite wing.	07
		OR	
Q.3	(a)	Derive the moment coefficient about the leading edge for a cambered airfoil.	07
	(b)	Derive the expression for the distance of the centre of pressure from the leading edge of a cambered airfoil.	07
Q.4	(a)	What is an expansion Hodograph? What is its use in supersonic aerodynamics?	07
	(b)	(i) Write the short note on Laminar flow air foils. (ii) Explain in brief the boundary layer separation. How it is different for laminar and turbulent flow?	07
		OR	
Q.4	(a)	Describe in brief the merits of `Lifting Surface Theory' for predicting lift distribution on a wing with an arbitrary platform. Make use of sketches and other representations in this regard.	07
	(b)	Compare the formulation in (a) above with that in the classical lifting line theory with details.	07
Q.5	(a)	With the aid of Kutta - Zukovsky transformation explain how a circle can be transformed into a cambered airfoil.	07
	(b)	Explain in detail Prandtl’s Classical Lifting line theory.	07
		OR	
Q.5	(a)	Explain behavior of fuselage and wing in compressible and non compressible case.	07
	(b)	Discuss Influence of downwash on tail plane and ground effect.	07

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